INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/47362

A. CLAS	SIFICATION OF SUBJECT MATTER F28F 9/04(2006.01)		
USPC: According to	165/173,174,175 International Patent Classification (IPC) or to both nation	onal classification and IPC	
	OS SEARCHED		
U.S. : 16	cumentation searched (classification system followed by 5/173, 174, 175		
	on searched other than minimum documentation to the e		
EAST search	ta base consulted during the international search (name for restriction orifice in header/tube end of heat exchan	of data base and, where practicable, search ger/evaporator/condenser	terms used) ·
C. DOCI	JMENTS CONSIDERED TO BE RELEVANT	Colorada and an angelogo	Relevant to claim No.
Category *	Citation of document, with indication, where ap	propriate, of the relevant passages	1-19
Α	EP 0228330 A1 (POITIER) 8 July 1987 (8.7.1987).		
А	US 5,632,329 A (FAY) 27 May 1997 (27.05.1997).	,	1-19
Α	US 4,724,904 A (FLETCHER et al.) 16 February 198	8 (16.02.1988).	1-19
A	US 4,607,689 A (MOCHIDA et al.) 26 August 1986 ((26.08.1986).	1-19
• А	US 5,145,223 (REAVIS et al.) 16 May 1995 (16.05.1	995).	1-19
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Further	documents are listed in the continuation of Box C.	See patent family annex.	-
	Special categories of cited documents:	"T" later document published after the inte- date and not in conflict with the applic	national filing date or priority
	t defining the general state of the art which is not considered to be of	principle or theory underlying the inves	ntion
particular	or relevance optication or patent published on or after the international filing date	"X" document of particular relevance; the considered novel or cannot be consider when the document is taken alone	laimed invention cannot be red to involve an inventive step
	it which may throw doubts on priority claim(s) or which is cited to the publication date of another citation or other special reason (as	"Y" document of particular relevance, the considered to involve an inventive step with one or more other such document	when the document is combined in
1	at referring to an oral disclosure, use, exhibition or other means	obvious to a person skilled in the art	
"P" documen	nt published prior to the international filing date but later than the date claimed	"&" document member of the same patent	
Date of the a	ctual completion of the international search	Date of mailing of the international sear JUN 2006	ch report _
12 June 2000	6 (12.06.2006)	Authorized officer	
Name and m	nailing address of the ISA/US ail Stop PCT, Attn: ISA/US	/ Leve Kue	
Co	ommissioner for Patents D. Box 1450 exandria, Virginia 22313-1450	Allen J. Flanigan Telephone No. (703) 308-0861	
	o. (571) 273-3201		

Form PCT/ISA/210 (second sheet) (April 2005)

PATENT COOPERATION TREATY

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 210_794PCT	FOR FURTHER ACTION	See item 4 below	
International application No. PCT/US2005/047362	International filing date (day/month/year) 28 December 2005 (28.12.2005)	Priority date (day/month/year) 02 February 2005 (02.02.2005)	
International Patent Classification (8th See relevant information in Form F	h edition unless older edition indicated) PCT/ISA/237		
Applicant CARRIER CORPORATION			

1.	This international preliminary re International Searching Authori	eport on patentability (Chapter ty under Rule 44 bis.1(a).	I) is issued by the International Bureau on behalf of the
2.	This REPORT consists of a total In the attached sheets, any refer to the international preliminary	ence to the written opinion of the	he International Searching Authority should he read as a reference
3.	This report contains indications	relating to the following items	:
	Box No. I	Basis of the report	
	Box No. II	Priority	
	Box No. 111	Non-establishment of opini applicability	on with regard to novelty, inventive step and industrial
1	Box No. IV	Lack of unity of invention	
	BOX NO. V	Reasoned statement under applicability; citations and	Article 35(2) with regard to novelty, inventive step or industrial explanations supporting such statement
	Box No. VI	Certain documents cited	
ļ	Box No. VII	Certain defects in the intern	national application
	Box No. VIII	Certain observations on the	e international application
4.	The International Bureau will onot, except where the applicant date (Rule 44bis .2).	communicate this report to design makes an express request unde	gnated Offices in accordance with Rules 44 <i>his.</i> 3(c) and 93 <i>his.</i> 1 but er Article 23(2), before the expiration of 30 months from the priority
<u> </u>			
			Date of issuance of this report 07 August 2007 (07.08.2007)
	The International Bu 34, chemin des Co 1211 Geneva 20, S	olombettes	Authorized officer Dorothée Mülhausen
Facsi	imile No. +41 22 338 82 70	·	e-mail: pt01.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

To: WILIAM W. HABELT 101 SOUTH SALINA STREET 4TH FLOOR SYRACUSE, NY 13202 WIPO WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1) Date of mailing (day/month/year) (PCT Rule 43bis.1) Applicant's or agent's file reference 210_794PCT International application No. PCT/US05/47362 International Patent Classification (IPC) or both national classification and IPC IPC: F28F 9/04(2006.01) USPC: 165/173,174,175 Applicant CARRIER CORPORATION 1. This opinion contains indications relating to the following items:	1
Applicant's or agent's file reference 210_794PCT International application No. PCT/US05/47362 International Patent Classification (IPC) or both national classification and IPC IPC: F28F 9/04(2006.01) USPC: 165/173,174,175 Applicant CARRIER CORPORATION International to the following items:	
Applicant's or agent's file reference 210_794PCT International application No. PCT/US05/47362 International Patent Classification (IPC) or both national classification and IPC IPC: F28F 9/04(2006.01) USPC: 165/173,174,175 Applicant CARRIER CORPORATION Date of mailing (day/month/year) FOR FURTHER ACTION See paragraph 2 below Priority date (day/month/year) 02 February 2005 (02.02.2005) 02 February 2005 (02.02.2005) International Patent Classification (IPC) or both national classification and IPC IPC: F28F 9/04(2006.01) USPC: 165/173,174,175 Applicant CARRIER CORPORATION	
Applicant's or agent's file reference 210_794PCT International application No. PCT/US05/47362 International Patent Classification (IPC) or both national classification and IPC IPC: F28F 9/04(2006.01) USPC: 165/173,174,175 Applicant CARRIER CORPORATION 1. This opinion contains indications relating to the following items:	
Applicant's or agent's file reference 210_794PCT International application No. PCT/US05/47362 International Patent Classification (IPC) or both national classification and IPC IPC: F28F 9/04(2006.01) USPC: 165/173,174,175 Applicant CARRIER CORPORATION 1. This opinion contains indications relating to the following items:	
210_794PCT International application No.	
PCT/US05/47362 28 December 2005 (28.12.2005) International Patent Classification (IPC) or both national classification and IPC IPC: F28F 9/04(2006.01) USPC: 165/173,174,175 Applicant CARRIER CORPORATION 1. This opinion contains indications relating to the following items:	
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IPC: F28F 9/04(2006.01) USPC: 165/173,174,175 Applicant CARRIER CORPORATION 1. This opinion contains indications relating to the following items:	
USPC: 165/173,174,175 Applicant CARRIER CORPORATION 1. This opinion contains indications relating to the following items:	
Applicant CARRIER CORPORATION 1. This opinion contains indications relating to the following items:	
1. This opinion contains indications relating to the following items:	
1. This opinion contains indications relating to the following items:	
Box No. I Basis of the opinion	
Box No. II Priority	l
Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	
Box No. IV Lack of unity of invention	ļ ·
Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	
Box No. VI Certain documents cited	
Box No. VII Certain defects in the international application	
Box No. VIII Certain observations on the international application	
2. FURTHER ACTION If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 bis that written opinions of this International Searching Authority will not be so considered.	s(b)
If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mail of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.	the ling
For further options, see Form PCT/ISA/220.	
3. For further details, see notes to Form PCT/ISA/220.	
Name and mailing address of the ISA/ US Date of completion of this opinion Authorized officer	
Mail Stop PCT, Attn: ISA/US Commissioner for Patents 12 June 2006 (12.06.2006)	
P.O. Box 1450 Alexandria, Virginia 22313-1450 Telephone No. (703) 308-0861	
Facsimile No. (571) 273-3201 Form PCT/ISA/237 (cover sheet) (April 2005)	

International application No.

PCT/US05/47362

Box No	o. I Basis of this opinion				
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1. With	regard to the language, this opinion has be				
\boxtimes	the international application in the lan	nguage in which it w	as filed	taking Comished for the no	moses of
	a translation of the international application international search (Rules 12.3(a) and 23	S.I(D)).			1
2. With inven	regard to any nucleotide and/or amino ac ntion, this opinion has been established on t	eld sequence disclosed he basis of:	in the international app	olication and necessary to	the claimed
a.	type of material				
	a sequence listing				
	table(s) related to the sequence list	ing			
ъ.	format of material				
	on paper				
	in electronic form				
c.	time of filing/furnishing		•		
	contained in the international app	lication as filed.			
	filed together with the internation		onic form.		
	furnished subsequently to this Aut				
	idmissied subsequently to and real				
3. 🔲	In addition, in the case that more than or or furnished, the required statements the application as filed or does not go beyon	iat the intompation ill i	THE SHOSEHHELITE OF MINER	tour tolere	as been filed o that in the
4. Add	litional comments:				
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Form PCT/ISA/237 (Box No. V) (April 2005)

International application No. PCT/US05/47362

Novelty (N) Claims 1-19 NO Inventive step (IS) Claims 1-19 Claims 1-19 YES NO Claims 1-19 YES	er No. V. Deasoned statement under Ru	le 43 bis.1(a)(i) with reg	ard to novelty,	inventive step o	r industrial
Novelty (N) Claims 1-19 YES NONE Inventive step (IS) Claims 1-19 YES Claims NONE Industrial applicability (IA) Claims 1-19 YES Claims NONE Industrial applicability (IA) Claims 1-19 YES Claims NONE NO Citations and explanations: aims 1-19 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a heat exchanger the tubes having plural discrete flow paths connected to headers with connectors having inlet, outlet, and intermediate chambers and strality of flow restriction ports in a spaced series arrangement as claimed. aims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed or used in industry.	applicability; citations and exp	planations supporting su	ch statement		
Novelty (N) Claims 1-19 Claims NONE Inventive step (IS) Claims 1-19 Claims NONE Industrial applicability (IA) Claims 1-19 Claims NONE Claims NONE NO					
Inventive step (IS) Claims 1-19 Claims NONE Industrial applicability (IA) Claims 1-19 Claims NONE Claims NONE Industrial applicability (IA) Claims 1-19 Claims NONE NO Clai		Claima 1 10		_	YES
Industrial applicability (IA) Claims NONE Industrial applicability (IA) Claims 1-19 Claims NONE Claims NONE Claims NONE Claims NONE Claims NONE Claims NONE Citations and explanations: aims 1-19 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a heat exchanger the tubes having plural discrete flow paths connected to headers with connectors having inlet, outlet, and intermediate chambers and arality of flow restriction ports in a spaced series arrangement as claimed. aims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed or made or used in industry.	Novelty (N)				NO
Industrial applicability (IA) Claims 1-19 Claims NONE NO Claims NONE Claims NONE Claims NONE Claims NONE Claims NONE NO Claims NONE Claims NONE Claims NONE Claims NONE NO Claims NONE NO NO NO Claims None NO NO Claims None NO NO NO NO Claims None NO NO NO Claims None NO NO NO Claims None NO NO NO NO NO Claims None NO NO NO NO Claims None NO NO NO NO NO Claims None NO NO NO NO NO NO Claims None NO NO NO	-	Claims HOND			
Claims NONE Industrial applicability (IA) Claims 1-19 Claims NONE NO Citations and explanations: In 1-19 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a heat exchanger the tubes having plural discrete flow paths connected to headers with connectors having inlet, outlet, and intermediate chambers and urality of flow restriction ports in a spaced series arrangement as claimed. aims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed or made or used in industry.	Inventive step (IS)	Claims <u>1-19</u>			YES
Citations and explanations: aims 1-19 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a heat exchanger the tubes having plural discrete flow paths connected to headers with connectors having inlet, outlet, and intermediate chambers and arality of flow restriction ports in a spaced series arrangement as claimed. aims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed or made or used in industry.	mvomvo stop (1-7)	Claims NONE			NO
Claims NONE NO Claims NO Claims NONE Claims NO C		61			YES
Citations and explanations: aims 1-19 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a heat exchanger th tubes having plural discrete flow paths connected to headers with connectors having inlet, outlet, and intermediate chambers and radity of flow restriction ports in a spaced series arrangement as claimed. aims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed or made or used in industry.	Industrial applicability (IA)				NONO
aims 1-19 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a near technaryer the tubes having plural discrete flow paths connected to headers with connectors having inlet, outlet, and intermediate chambers and urality of flow restriction ports in a spaced series arrangement as claimed. aims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed or made or used in industry.		Claims NONE			
aims 1-19 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a near technaryer the tubes having plural discrete flow paths connected to headers with connectors having inlet, outlet, and intermediate chambers and urality of flow restriction ports in a spaced series arrangement as claimed. aims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed or made or used in industry.					
aims 1-19 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a near technaryer the tubes having plural discrete flow paths connected to headers with connectors having inlet, outlet, and intermediate chambers and urality of flow restriction ports in a spaced series arrangement as claimed. aims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed or made or used in industry.	Citations and explanations:				
th tubes having plural discrete frow paths colinected to free arrangement as claimed. arrality of flow restriction ports in a spaced series arrangement as claimed. aims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed or made or used in industry.		tale 22(2) (2) because the n	rior art does not te	ach or fairly sugge	est a heat exchanger
aims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed of made or used in industry.	aims 1-19 meet the criteria set out in PCT Arti	cle 33(2)-(3), because the property of the headers with conne	ctors having inlet	, outlet, and intern	nediate chambers and
aims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed or made or used in industry.	th tubes having plural discrete flow paths conf	es arrangement as claimed.		•	
made or used in industry.	irality of flow restriction ports in a spaced seri	100 4114118-1-1-1		•	
made or used in industry.				L. Laggues the suh	iect matter claimed o
made or used in industry.	aims 1-19 meet the criteria set out in PCT Arti	icle 33(4), and thus have ind	ustrial applicabili	ty necause the suc	Jeet matter comme
	made or used in industry.				
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PATENT COOPERATION TREATY

From the NTERNATIONAL SEARCHING AL	THORITY	_		
To: WILLIAM W. HABELT 101 SOUTH SALINA STREET 4TH FLOOR SYRACUSE, NY 13202		WR INTERNATIO	PCHTO 0 4 JUL 2006 WIPO PCT DITTEN OPINION OF THE DNAL SEARCHING AUTHORITY	
			(PCT Rule 43bis.1)	
		Date of mailing (day/month/year)	29 JUN 2006	
Applicant's or agent's file reference		FOR FURTHER	ACTION See paragraph 2 below	
210_794PCT				
International application No.	International filing date	•	Priority date (day/month/year)	
PCT/US05/47362	28 December 2005 (28		02 February 2005 (02.02.2005)	
International Patent Classification (I	PC) or both national classifica	ition and IPC	,	
IPC: F28F 9/04(2006.01)				
USPC: 165/173,174,175 Applicant				
CARRIER CORPORATION	_			
CAUGUSA SOLU SILVER				
1. This opinion contains indication	s relating to the following ite	ms:		
Box No. I Basis	of the opinion			
Box No. II Priori	=			
Box No. III Non-e	stablishment of opinion with 1	regard to novelty, inve	entive step and industrial applicability	
	of unity of invention			
Box No. V Reaso	ned statement under Rule 43 <i>b</i> ability; citations and explanat	is.1(a)(i) with regard ions supporting such	to novelty, inventive step or industrial statement	
Box No. VI Certai	n documents cited			
Box No. VII Certa	n defects in the international	application		-
Box No. VIII Certa	n observations on the internat	ional application		
2. FURTHER ACTION				
If a demand for international	mining Authority ("IPEA") to be the IPEA and the chose	en IPEA has notified	ll be considered to be a written opinion of the is not apply where the applicant chooses an the International Bureau under Rule 66.1bis(b) dered.	
IPEA a written reply together of Form PCT/ISA/220 or befo	where appropriate, with ane re the expiration of 22 months		IPEA, the applicant is invited to submit to the expiration of 3 months from the date of mailing e, whichever expires later.	
For further options, see Form	C1/ISA/220.			
3. For further details, see notes to	Form PCT/ISA/220.	·	\rightarrow	
Name and mailing address of the I	SA/ US Date of com	pletion of this opinior	Authorized officer	_
Mail Stop PCT, Attn: ISA/L	ie l	6 (12.06.2006) —	Allen J. Flanigan	
Commissioner for Patents P.O. Box 1450		/	Telephone No. (703) 308-0861	
Alexandria, Virginia 22313 Facsimile No. (571) 273-3201	1450		Telephone No. (703) 300-0001] .

Form PCT/ISA/237 (cover sheet) (April 2005)

International application No.

PCT/US05/47362

Box No. I Basis of this opinion
1. With regard to the language, this opinion has been established on the basis of:
the international application in the language in which it was filed
a translation of the international application into, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
a. type of material
a sequence listing
table(s) related to the sequence listing
b. format of material
on paper
in electronic form
c. time of filing/furnishing
contained in the international application as filed.
filed together with the international application in electronic form.
furnished subsequently to this Authority for the purposes of search.
Turnished subsequently to this Authority to the purpose
In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Form PCT/ISA/237 (Box No. V) (April 2005)

International application No. PCT/US05/47362

applicability; citations and ex	ule 43 <i>bis</i> .1(a)(i) with regard to novelty, in appear to novelty, in a specific to novelty, in a specific to novelty, in a specific to novelty, in the specific to novelty the specific to novelty.	
Statement		_YES
Novelty (N)		210
• • • • • • • • • • • • • • • • • • • •	Claims NONE	NU
Inventive step (IS)	Claims 1-19	YES
inventive step (13)	Claims NONE	
	Claims 1-19	YES
Industrial applicability (IA)	Claims NONE	NO
laims 1-19 meet the criteria set out in PCT Ar ith tubes having plural discrete flow paths co- urality of flow restriction ports in a spaced se	rticle 33(2)-(3), because the prior art does not tead nnected to headers with connectors having inlet, or tries arrangement as claimed.	outlet, and intermediate chambers and
laims 1-19 meet the criteria set out in PCT A	rticle 33(4), and thus have industrial applicability	because the subject matter claimed of
e made or used in industry.	. •	
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